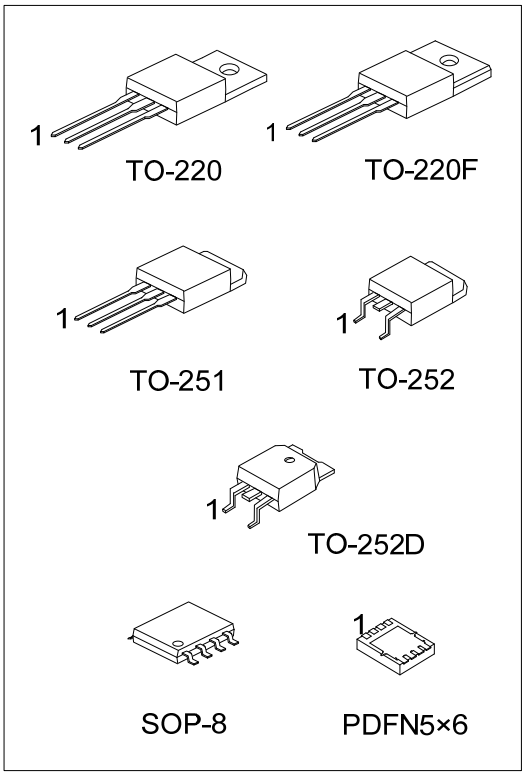
UTT70N06

Power MOSFET

70A, 60V N-CHANNEL POWER MOSFET



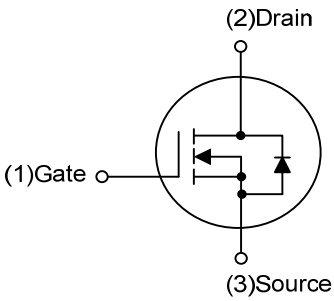
■ DESCRIPTION

The UTC **UTT70N06** is N-channel enhancement mode power field effect transistors with stable off-state characteristics, fast switching speed, low thermal resistance, usually used at telecom and computer application.

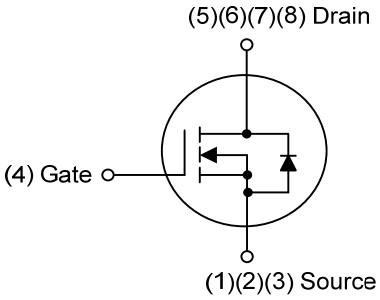
■ FEATURES

* $R_{DS(ON)}$ ≤ 12 mΩ @ V_{GS}=10V, I_D=35A
* Fast switching capability
* Avalanche energy specified
* Improved dv/dt capability

■ SYMBOL



TO-220/TO-220F
TO-251/TO-252/TO-252D

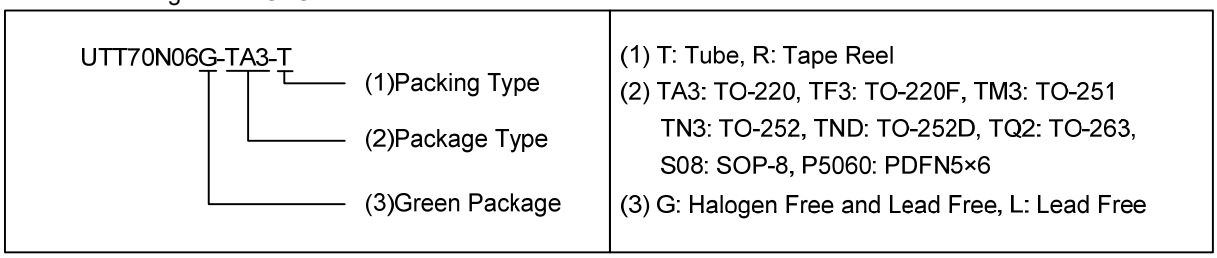


SOP-8/PDFN5×6

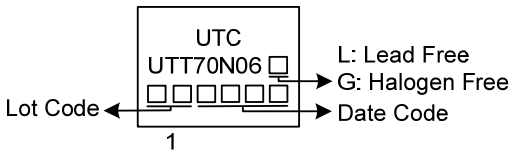
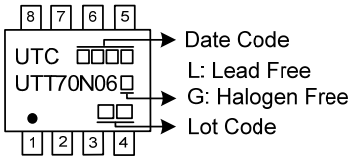
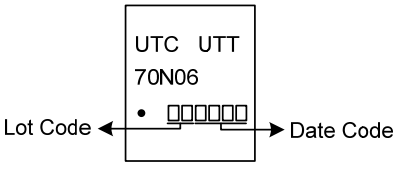
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing
Lead Free	Halogen Free		1	2	3	4	5	6	7	8	
UTT70N06L-TA3-T	UTT70N06G-TA3-T	TO-220	G	D	S	-	-	-	-	-	Tube
UTT70N06L-TF3-T	UTT70N06G-TF3-T	TO-220F	G	D	S	-	-	-	-	-	Tube
UTT70N06L-TM3-T	UTT70N06G-TM3-T	TO-251	G	D	S	-	-	-	-	-	Tube
UTT70N06L-TN3-R	UTT70N06G-TN3-R	TO-252	G	D	S	-	-	-	-	-	Tape Reel
UTT70N06L-TND-R	UTT70N06G-TND-R	TO-252D	G	D	S	-	-	-	-	-	Tape Reel
UTT70N06L-S08-R	UTT70N06G-S08-R	SOP-8	S	S	S	G	D	D	D	D	Tape Reel
UTT70N06L-P5060-R	UTT70N06G-P5060-R	PDFN5×6	S	S	S	G	D	D	D	D	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source



■ MARKING

PACKAGE	MARKING
TO-220 / TO-220F TO-251 / TO-252 TO-252D	
SOP-8	
PDFN5×6	

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	60	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current		I_D	70	A
Drain Current Pulsed (Note 2)		I_{DM}	140	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	165	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	2.1	V/ns
Power Dissipation	TO-220	P_D	145	W
	TO-220F		36	W
	TO-251/TO-252 TO-252D		55	W
	SOP-8		7.5	W
	PDFN5×6		50	W
Junction Temperature		T_J	+150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
2. Repeativity rating: pulse width limited by junction temperature.
3. L=0.1mH, I_{AS}=57.5A, V_{DD}=25V, R_G=20Ω, Starting T_J=25°C
4. I_{SD}≤48A, di/dt≤300A/μs, V_{DD}≤BV_{DSS}, Starting T_J=25°C

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	°C/W
	TO-251/TO-252 TO-252D		110	°C/W
	SOP-8		125	°C/W
	PDFN5×6		60	°C/W
Junction to Case	TO-220	θ_{JC}	0.86	°C/W
	TO-220F		3.47	°C/W
	TO-251/TO-252 TO-252D		2.2 (Note)	°C/W
	SOP-8		16.67 (Note)	°C/W
	PDFN5×6		2.5 (Note)	°C/W

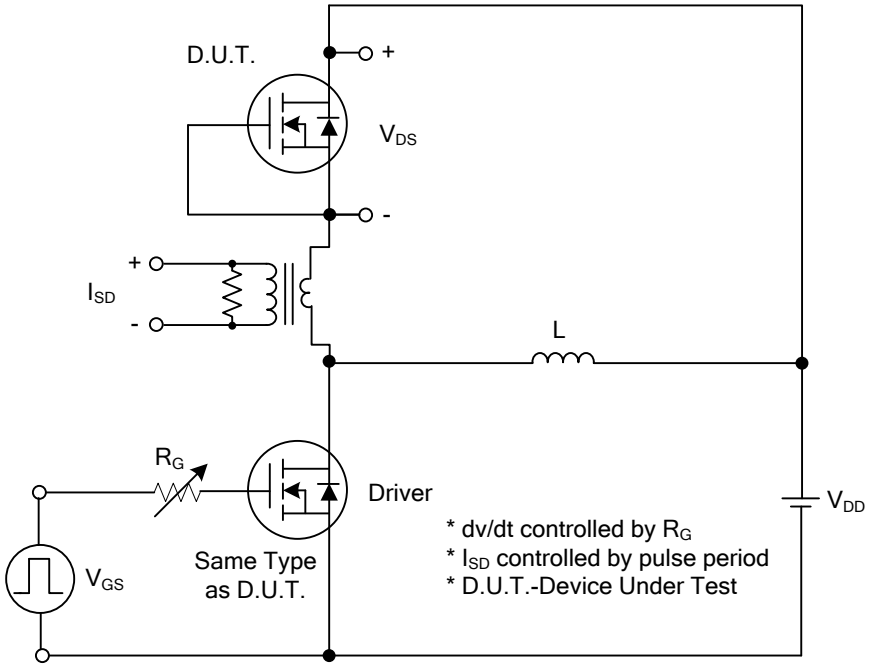
Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

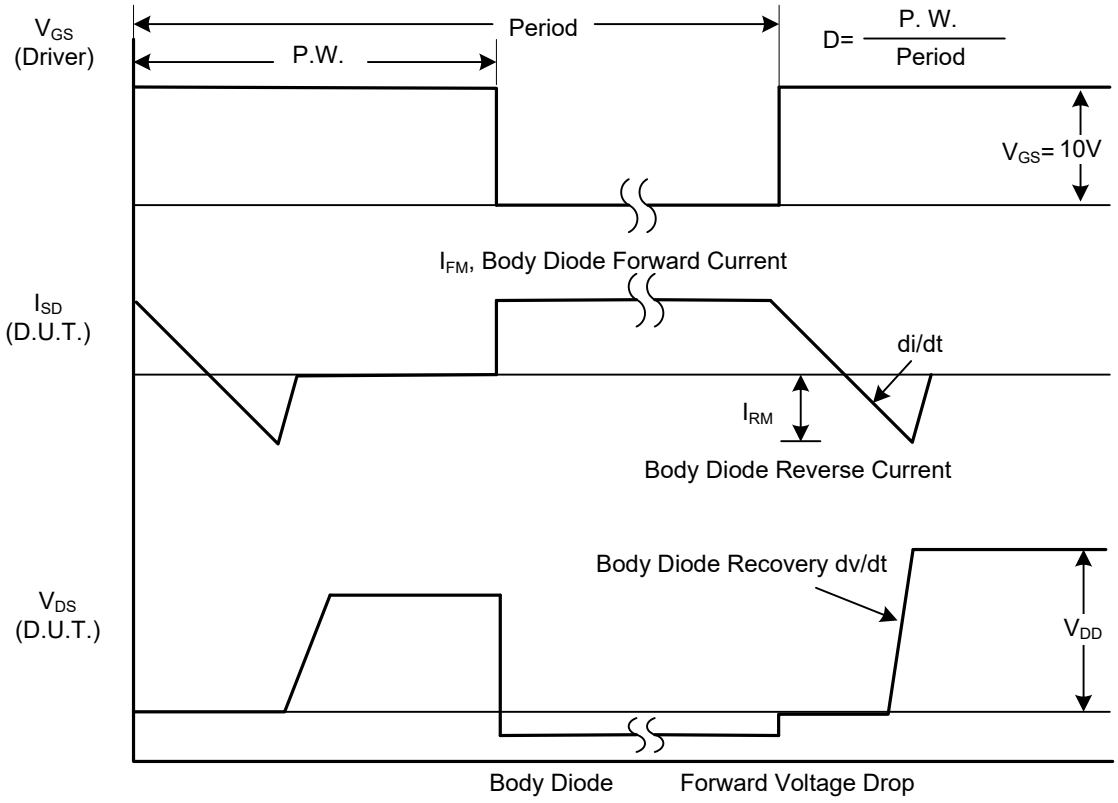
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	60			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=60V, V_{GS}=0V			1	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=20V, V_{DS}=0V			100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=35A			12	mΩ
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1MHz		3650		pF
Output Capacitance		C_{OSS}			330		pF
Reverse Transfer Capacitance		C_{RSS}			286		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge		Q_G	V_{DS}=48V, V_{GS}=10V, I_D=70A, I_G=1mA (Note 1, 2)		90		nC
Gate-Source Charge		Q_{GS}			16		nC
Gate-Drain Charge (Miller Charge)		Q_{GD}			25		nC
Turn-On Delay Time		$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=70A, R_G=3Ω (Note 1, 2)		16		ns
Turn-On Rise Time		t_R			18		ns
Turn-Off Delay Time		$t_{D(OFF)}$			60		ns
Turn-Off Fall Time		t_F			24		ns
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Maximum Continuous Drain-Source Diode Forward Current		I_S				70	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				140	
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=70A			1.4	V
Reverse Recovery Time		t_{rr}	V_{GS}=0V, I_S=30A, dI_F/dt=100A/μs		45		ns
Reverse Recovery Charge		Q_{rr}			50		nC

Notes: 1. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS



1A Peak Diode Recovery dv/dt Test Circuit



1B Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS

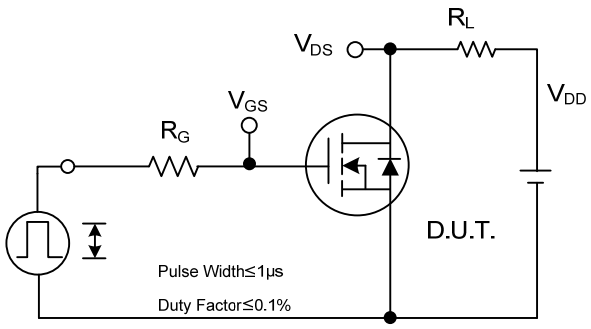


Fig. 2A Switching Test Circuit

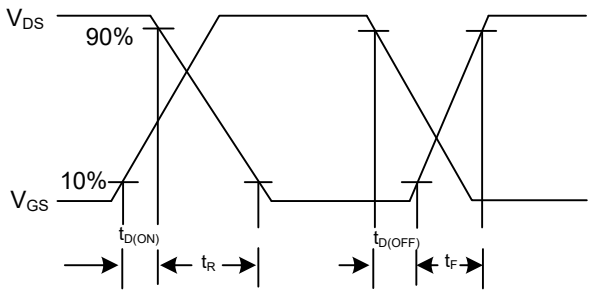


Fig. 2B Switching Waveforms

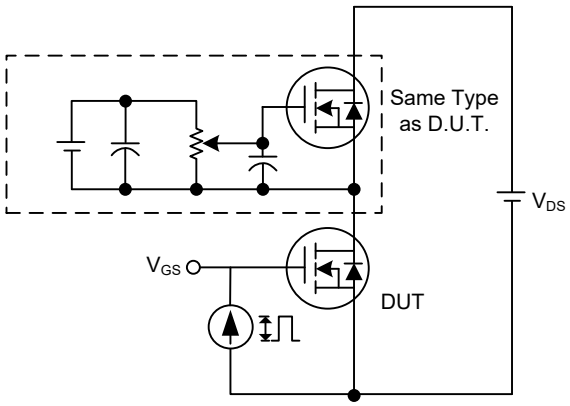


Fig. 3A Gate Charge Test Circuit

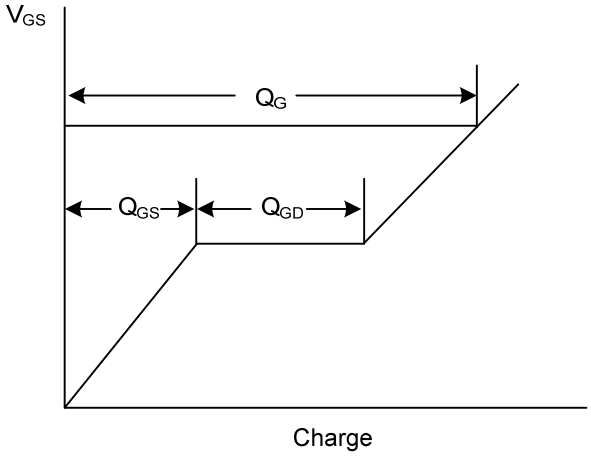


Fig. 3B Gate Charge Waveform

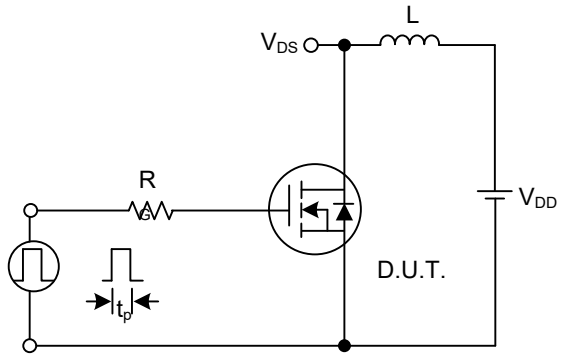


Fig. 4A Unclamped Inductive Switching Test Circuit

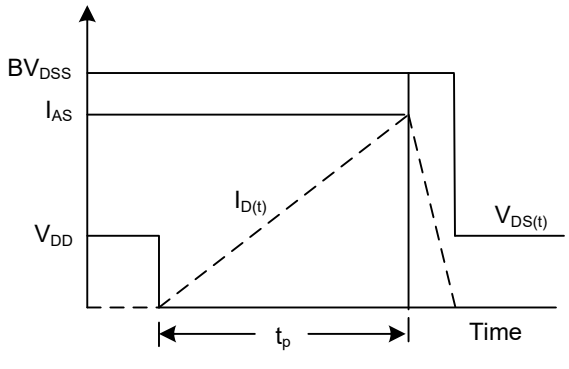
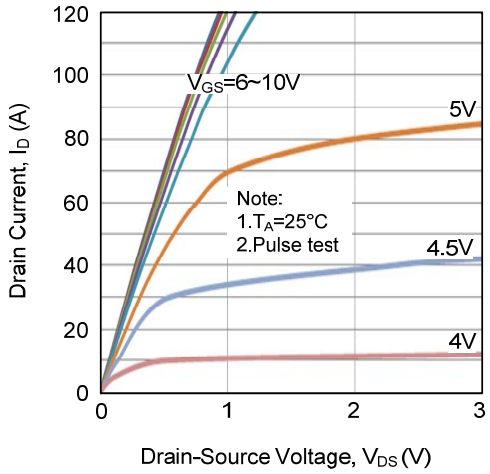


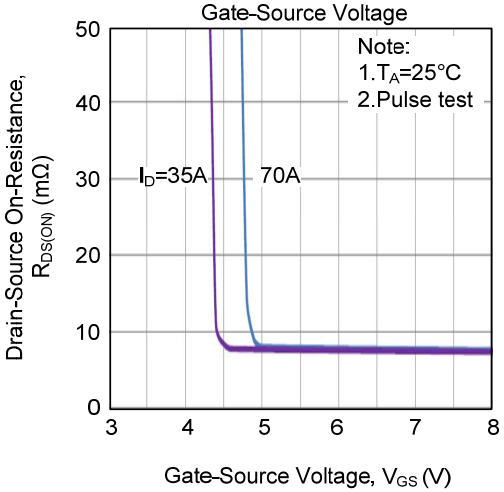
Fig. 4B Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

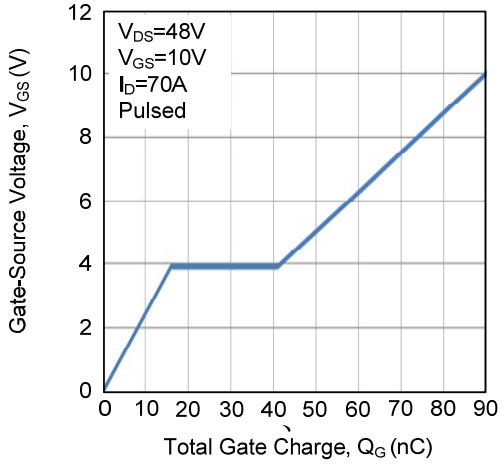
Drain Current vs. Drain-Source Voltage



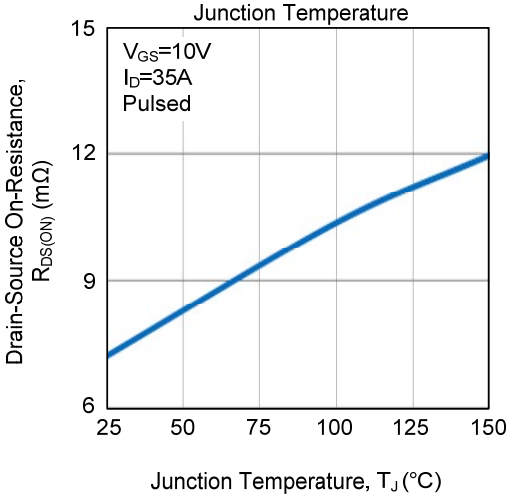
Drain-Source On-Resistance vs. Gate-Source Voltage



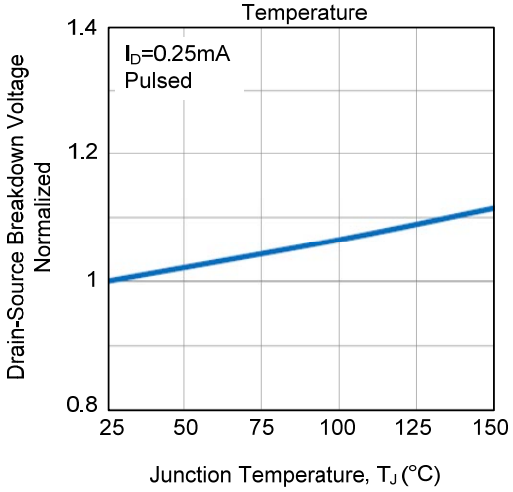
Gate Charge Characteristics



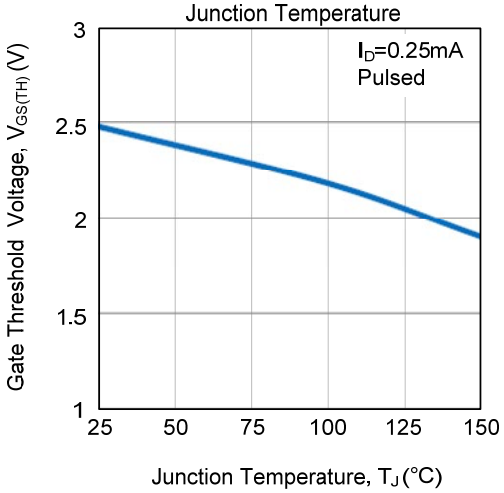
Drain-Source On-Resistance vs. Junction Temperature



Breakdown Voltage vs. Junction Temperature

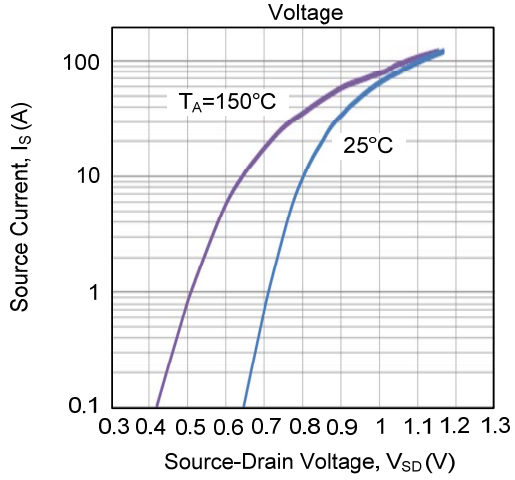


Gate Threshold Voltage vs. Junction Temperature

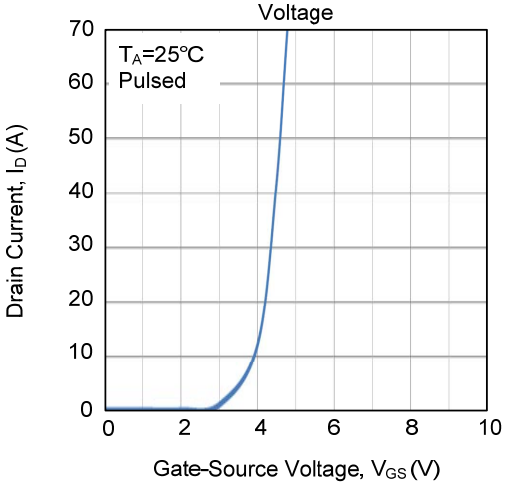


■ TYPICAL CHARACTERISTICS (Cont.)

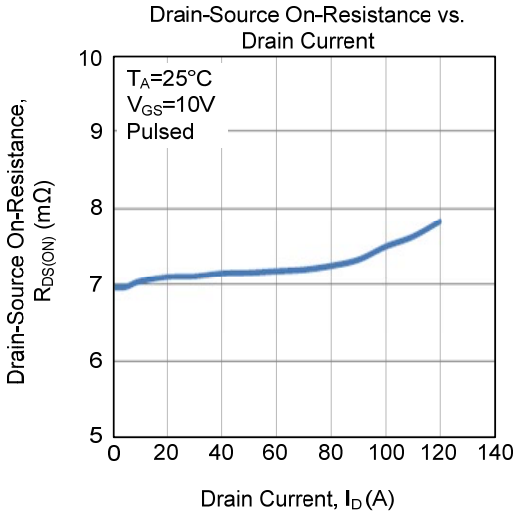
Source Current vs. Source-Drain Voltage



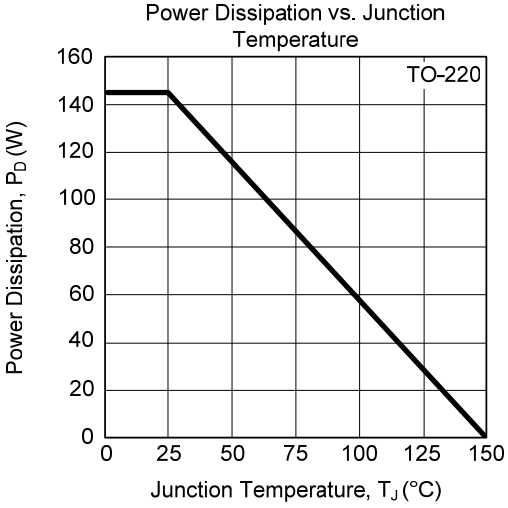
Drain Current vs. Gate-Source Voltage



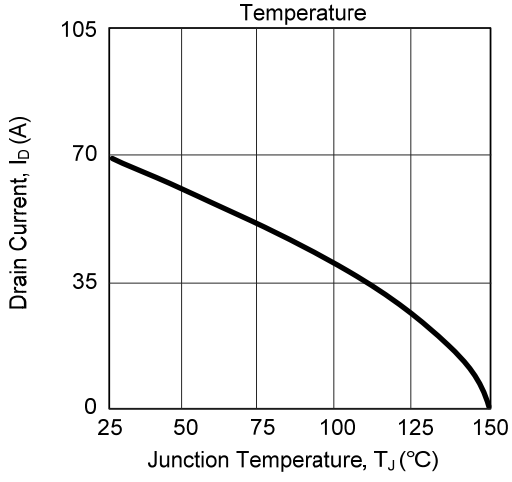
Drain-Source On-Resistance vs. Drain Current



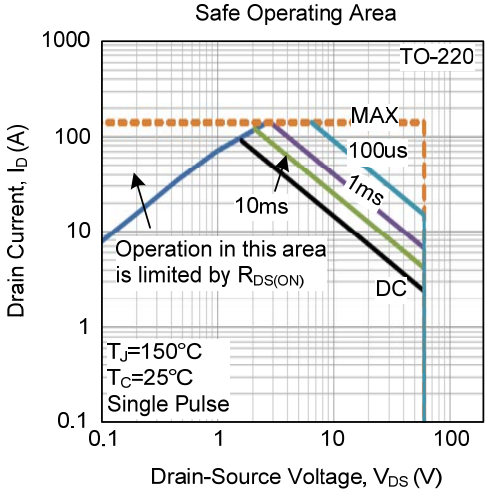
Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



Safe Operating Area



■ TYPICAL CHARACTERISTICS (Cont.)